(12) UK Patent Application (19) GB (11) 2 083 440 A

(21) Application No **8126789**
(22) Date of filing **4 Sep 1981**
(30) Priority data
(31) **201997**
(32) **5 Sep 1980**
(33) **Belgium (BE)**
(43) Application published **24 Mar 1982**
(51) **INT CL³ G11B 23/28 27/34**
(52) Domestic classification **B8M** 682 685 687 C **G5R** B264 B311 B37Y B421 B472 B60X B682 B684 B687 B781 B789 B83X JA JB
(56) Documents cited **GB 2043982**
(58) Field of search **B8M**
(71) Applicants **Staar SA, Rue des Ateliers, 19—21 B—1080 Brussels, Belgium**
(72) Inventor **Theophiel Clement Joseph Lodewijk Staar**
(74) Agents **Mewburn Ellis & Co., 70—72 Chancery Lane, London WC2A 1AD**

(54) **Tape cassette with memory device**

(57) A cassette (200) has a memory device (52) for information concerning the cassette or the tape therein, and a memory error indicating element (310). When the cassette is inserted in recording and reproducing apparatus that does not have means for co-operation with the cassette memory, a member of the apparatus for unlocking the cassette reels (e.g. a cylindrical shaped spindle) also acts to place said element (310) in a memory error indicating state. In apparatus having means for co-operation with the memory, a modified member (e.g. a semi-cylindrical shaped spindle) is provided that does not act on the error indicating element (310) and the apparatus may include a circuit to monitor the state of the element (310). The error indicating element may be an electric component or an electronic component.

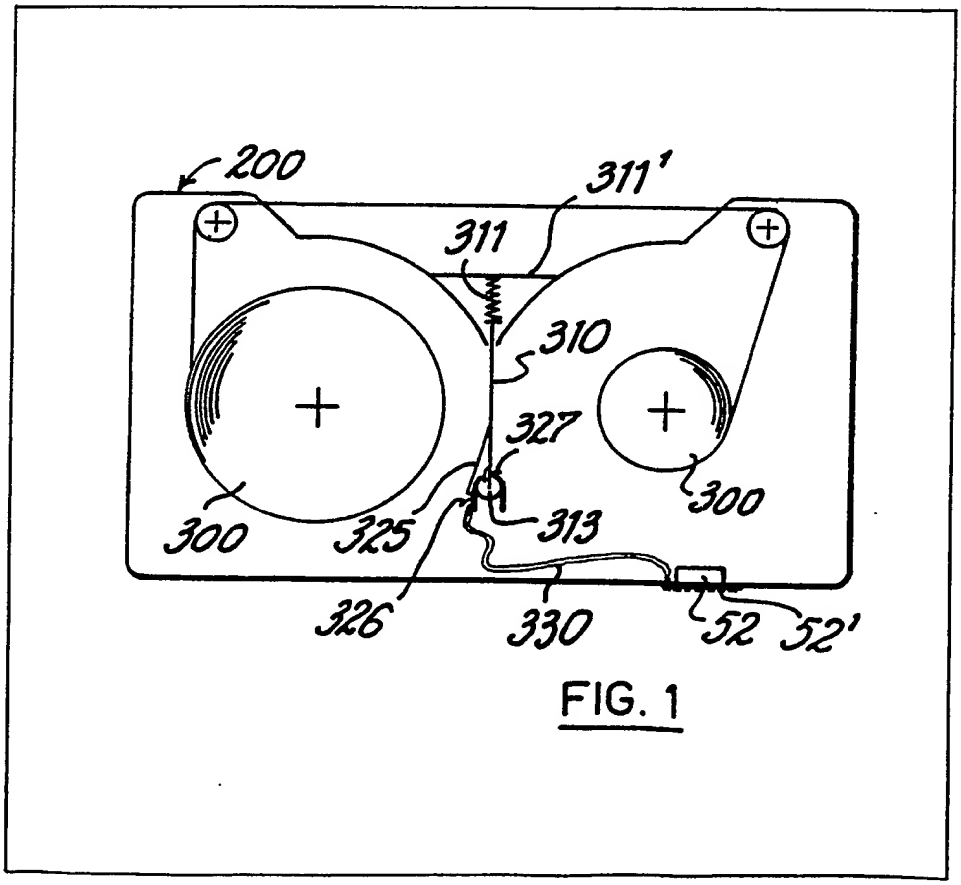


FIG. 1

GB 2 083 440 A

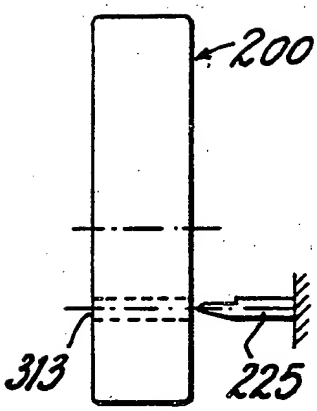


FIG. 1A

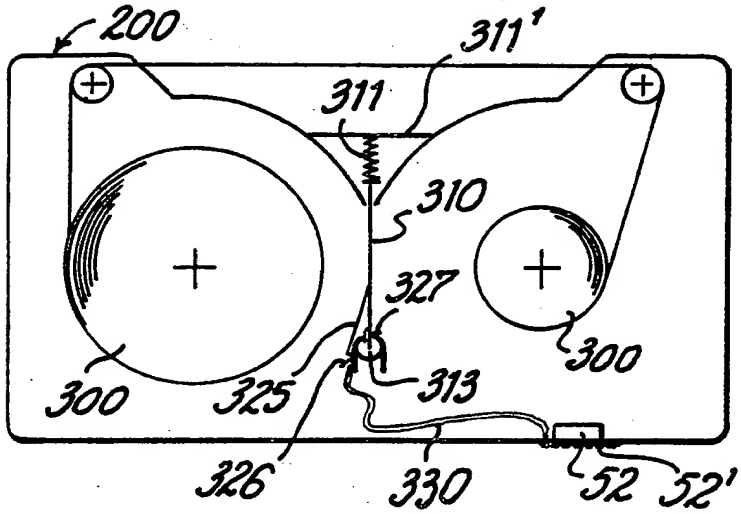


FIG. 1

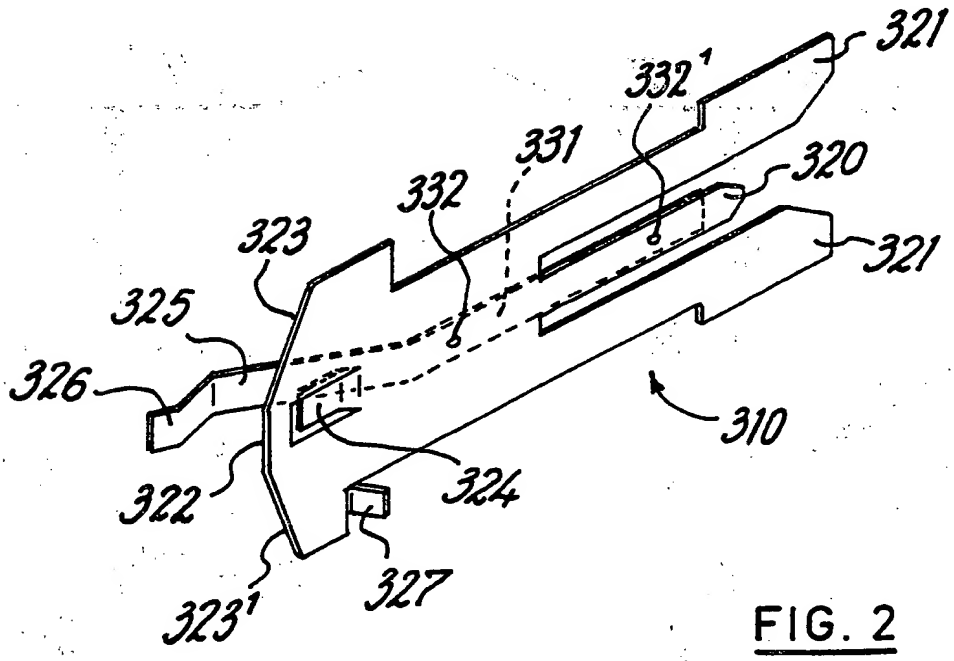


FIG. 2

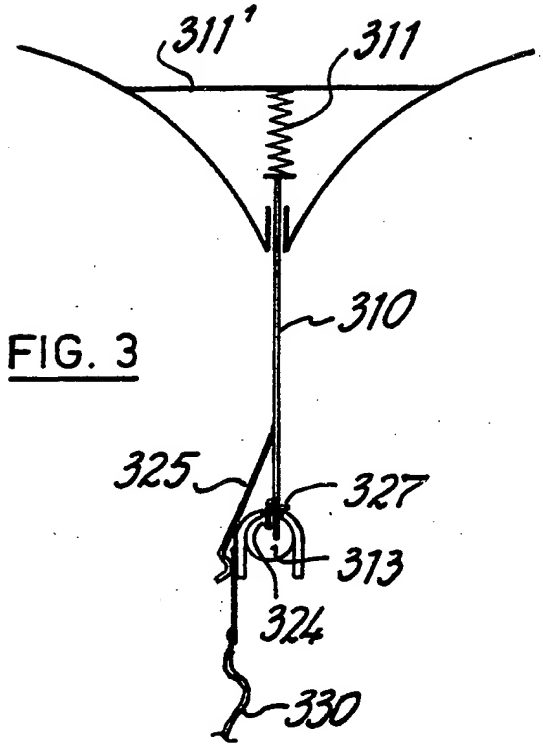


FIG. 3

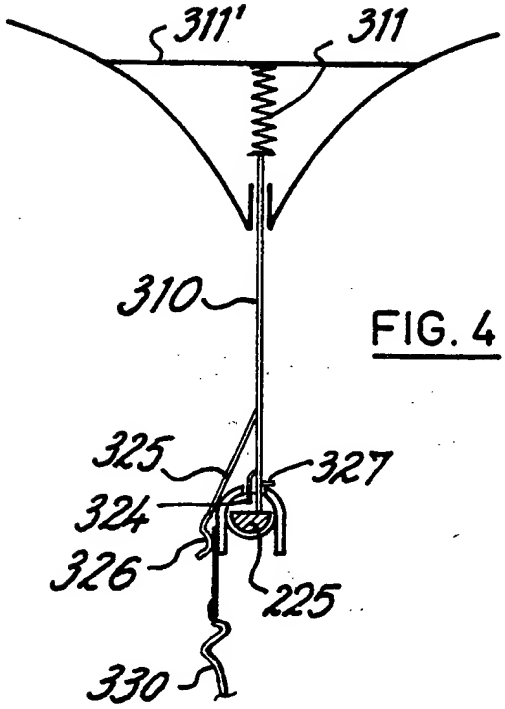


FIG. 4

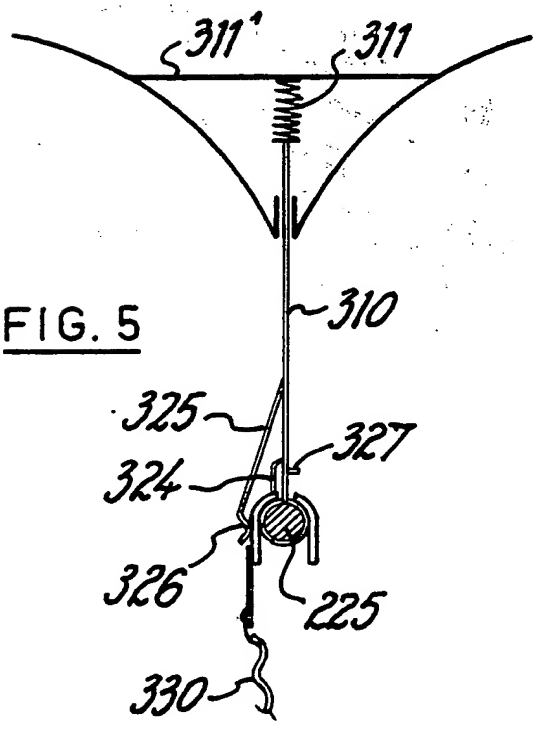


FIG. 5

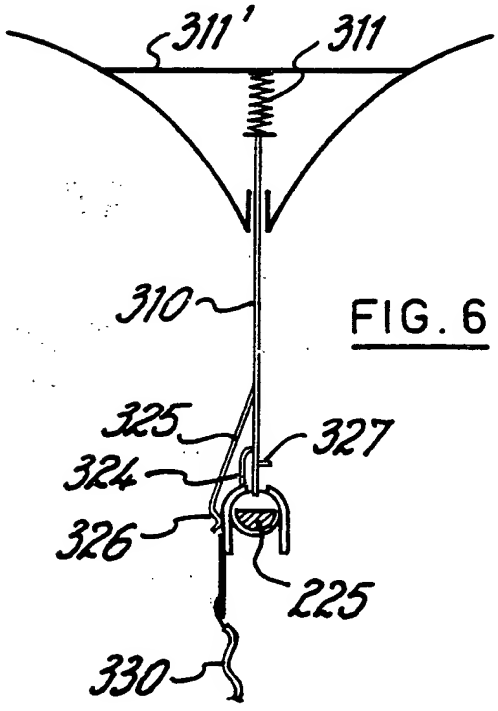


FIG. 6

FIG. 7

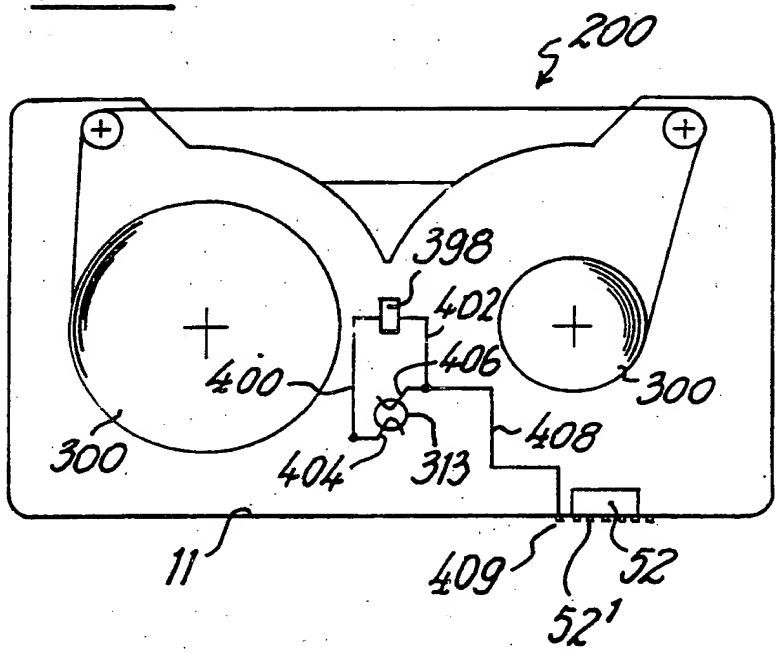


FIG. 8

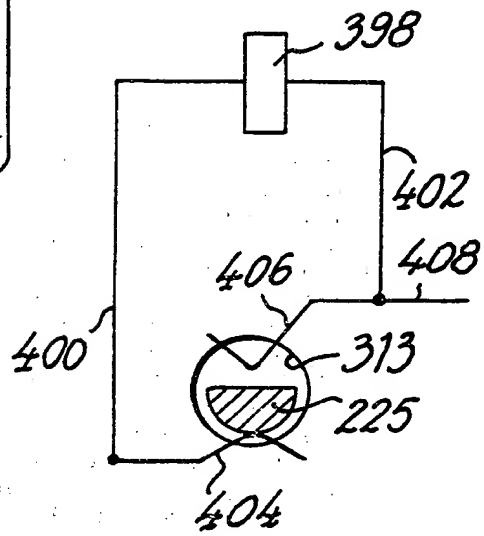
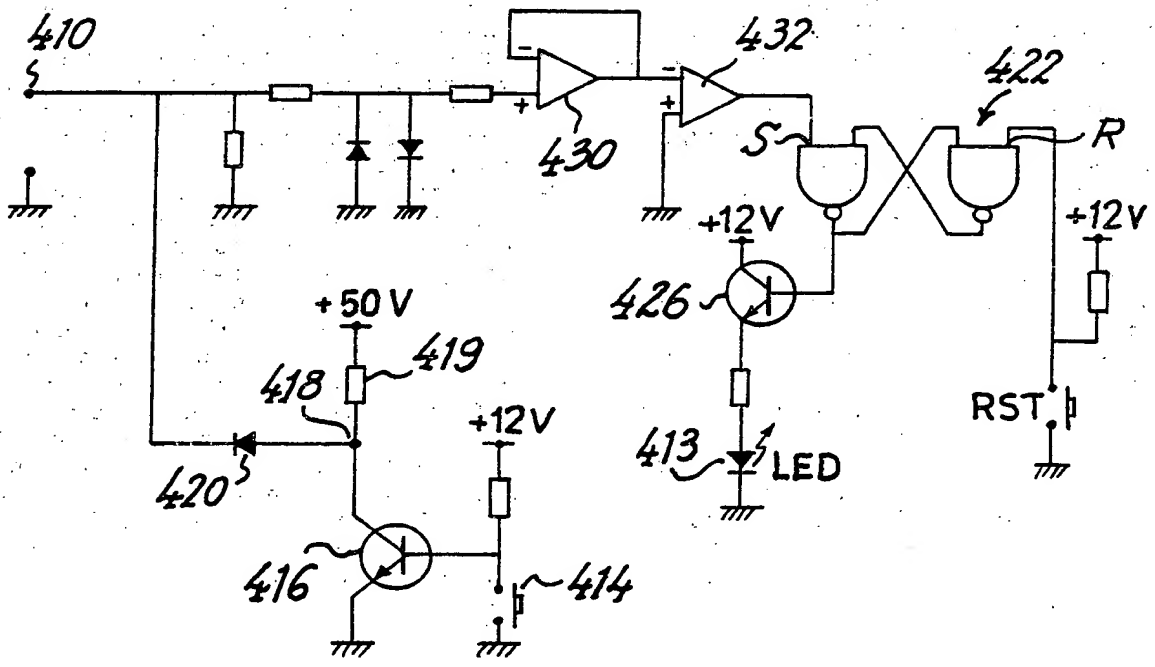


FIG. 9



SPECIFICATION

Tape cassette data storage

The present invention relates to cassettes with memories for storing data relating to the cassette or the tape therein and to the provision of means for warning the user that the cassette has been introduced and played in a recording and reproducing apparatus which has not been made for a cassette with a memory.

One object of the invention which applies more particularly to "video" cassettes, is to permit the production, both in the electric and electronic fields, of devices which are particularly simple and advantageous both from the point of view of production and fitting and from the point of view of cost.

In an arrangement according to the present invention the cassette is provided with an element which is made and operates so as to comprise a state which is capable of being modified if the cassette has been played without its memory having been activated, and the apparatus, which is intended for receiving the said cassette and is equipped with the means necessary for operating the memory, comprises means of monitoring the state of the element carried by the cassette.

The invention will be described below with reference to the drawings, in which:

Figures 1 to 6 relate to a first embodiment (of the electric type), and

Figures 7, 8 and 9 relate to a second embodiment (of the electronic type).

Referring to Figures 1 and 1A a video cassette 200 is illustrated having reels 300 of recording tape.

In the cassette is contained an electronic memory 52 and means are provided on the outside of the housing serving as memory terminals 52^1 adapted to engage and make electrical connections to terminals of a peripheral device.

At 225 (Figure 1A) is shown a metal spindle which ensures the unlocking of the reels 300 and which penetrates into the cassette (through opening 313) when the latter is brought into the operative position (see Figures 25, 26, 27 of patent application Nr 79.37208 filed on 26th October 1979.

The spindle 225 unlocks the two reels 300 of the magnetic tape when the cassette is correctly positioned in the recording and/or reproducing apparatus.

As shown in Figure 1, between the two reels 300 there is situated, in the illustrated example, a plate 310 which is subjected to the action of a spring 311, which spring bears against a piece 311^1 forming part of the housing of the cassette and acts on one end of the plate 310 so as to cause the other end of the plate 310 to penetrate into the opening 313 which allows the spindle 225 to unlock the reels.

The plate 310 is made in a particular manner and comprises:

(Figure 2) a central blade 320 which extends along the longitudinal axis of the plate 310 and serves to support and guide the spring 311.

Two blades 321—321^1, which are situated on either side of the blade 320 and ensure guiding of the plate 310 during its translatory movement.

At the end 322 opposite that which is subjected to the action of the spring 311 there are provided inclined sections 323—323^1 which are intended for co-operating with the unlocking spindle 225.

A tab 324 which is cut out of the plate 310 and projects along the longitudinal axis of the plate 310; the said tab 324 is intended for locking the plate 310 in a properly determined position (stable state), as explained below.

A tab 325 which is an extension of a flat strip 331 attached to the plate 310 at 332 and 332^1 along the longitudinal axis thereof; the said tab 325 forms an acute angle to the longitudinal axis of the plate and comprises an end which is bent (at 326) so as to close and ensure an electrical contact with a wire 330 connected to the memory 52.

A stop 327 which also ensures a stable state, as explained below.

The tab 325 bears against the outer circumference of the opening 313 made in the cassette.

All the recorders provided with means allowing operation and use of the memory comprise a spindle 225 having a semi-cylindrical cross-section, as shown in Figure 4.

It is understood that in this case, when a spindle 225 having such a cross-section is introduced or extracted, the plate 310 is not subjected to any translatory movement (Figures 1, 3, 4). A stable state is created by the projection 327 which forms a stop.

As a result, the bent end 326 of the tab 325 remains in contact with the wire 330 which is connected to the memory; it is indicated in this way that the content of the memory accords with the instantaneous position of the magnetic tape (the circuit is closed by the plate 310 and the spindle 225 which is earthed).

On the other hand, the recorders which are not equipped with the necessary means for operating the memory are equipped with a spindle 226 having a cylindrical cross-section identical to those which are currently fitted during manufacture in all "video" recording equipment.

When the said cylindrical spindle co-operates with the inclined sections 323—323^1 of the plate 310, the said plate moves back in such a way that the tab 324 is situated outside the opening 313, and when the cassette 200 is withdrawn from such an apparatus, the tab 324 is caused, by virtue of a slight tilting movement of the plate 310, to bear against the outer circumference of the opening 313, which prevents the return movement of the plate 310. This gives rise to a second stable state.

Furthermore, the contact, with the wire 330, which is ensured by the tab 325 is opened and the user will thus be warned of this situation

(Figure 5).

It should be noted that, once the magnetic tape has been rewound to the beginning, it is sufficient to introduce, for example, a pencil point into the opening 313, to cause the plate 310 to move back and pivot in such manner that it returns to the position it occupies in Figure 1.

The device shown in Figures 7 to 9 uses extremely simple and reliable electric and electronic means which necessitate the presence of only one element in the cassette housing, and is based on the use of an electronic component.

In accordance with this embodiment of the invention, the memory error signal device comprises a capacitor 398, and circuit connections 400, 402 to bent contacts 404, 406 which are mounted in the cassette housing 11 to provide terminal elements adjacent the opening 313 in the cassette housing. The memory error signal device is adapted to be set from a first to a second state by a conventional spindle penetrating the opening 313 engaging the terminals 404, 406. Using a conventional cylindrical spindle of a peripheral device, which spindle is grounded, by penetrating the peripheral device in the opening 313 and engaging the terminals 404, 406, the capacitor 398 is discharged, the discharged state constituting the second "error" state of the device. Thus, when a cassette with memory is inserted into a tape deck apparatus, or other peripheral device, not equipped to cooperate with the memory means of the unit, the conventional spindle of such a device is operable to discharge the capacitor 398 and thus set the memory error signal device in its error state.

Further in carrying out the invention, the terminal 404 and circuit connections 402, 408 leading to a terminal 409 on the outside of the cassette housing adjacent the terminals of the memory 52, provide a circuit adapted to be connected to a monitoring circuit of a peripheral device for monitoring the state of the capacitor 398. For this purpose, the terminals 404, 406 are located on the opening 313 and so configured that a spindle having a particular tip configuration 225 makes electrical contact with the signal device terminal 404 but does not contact the signal device terminal 406. In this manner the state of the capacitor 398 may be monitored by a circuit of a peripheral device, connected to the capacitor 398 by means of the terminal 409, the circuit being completed through the terminal 404 and the spindle tip 225 which is grounded, providing a grounded return.

Thus, referring to Fig. 9, in carrying out the invention a monitoring circuit is provided for a peripheral device, for monitoring the state of the memory error signal device of this invention as disclosed in Fig. 7. With modifications, this monitoring circuit may also be used for monitoring the state of the memory error signal device of this invention as disclosed in Figs. 1—6.

The monitoring circuit has a terminal 410 adapted to be connected to the terminal 409 on the outside of the cassette 200 shown in Fig. 7. The monitoring circuit includes a detecting and display section including a LED 413 for detecting the state of charge of the capacitor 398 of a memory error signal device and for providing a visual signal of a memory no-error state. The monitoring circuit also includes a charge section for transferring a source voltage to a memory error signal device of a cassette, to charge the capacitor 398 prior to the removal of the cassette from a peripheral device after the cassette memory has been updated with accurate tape position data, and thereby set the capacitor in its charge state representing the no-error state of the memory.

Referring to the charge section of the monitoring circuit, this section includes a charge pushbutton 414 connected in the base circuit of a transistor 416. With the pushbutton 414 open, the base-collector junction of the transistor 416 is reverse biased and the base-emitter junction is forward biased so that the transistor 416 is nonsaturated and effectively acts as an open circuit at the node 418. When the charge pushbutton 414 is actuated either manually or automatically, for example prior to removal of a cassette from the peripheral device, the forward bias is removed from the base-emitter junction which turns the transistor 416 off, the 50-volt source is effectively connected through a resistor 419 and a diode 420 to the output terminal 410, and the source voltage is transmitted to the capacitor 398 to recharge the capacitor to its maximum level of 50 volts.

By this means, a capacitor 398 is set in its no-error state representing that the memory contains accurate data as to tape position, so that when the cassette is next inserted in a peripheral device having means for cooperation with the cassette memory and a monitoring circuit as disclosed herein, the state of the capacitor can be detected to determine that the memory contains accurate tape position data.

The detecting and display section of the monitoring circuit includes the LED 413 which functions as a signal light to visually display the no-error state of the capacitor 398 when that state is detected by the monitoring circuit. The detection and display section also includes a flip-flop latch 422 which turns the LED signal light 413 on when the circuit detects that the capacitor 398 is charged. The circuit is operative to detect the full charged state of the capacitor, and a partially discharged state which may be caused by a gradual discharge of the capacitor 398 during a long period of non-use. It is one of the features of the arrangement, however, that a cassette equipped with a memory error signal device of the kind shown in Fig. 8 may be left for long periods without the capacitor 398 fully discharging, sufficient charge being maintained to trigger the monitoring circuit and indicate that the cassette memory is accurate. This feature is obtained without any power source being required in the cassette itself, the charge capacitor providing the memory no-error signal.

To achieve this, the detection and display section of the monitoring circuit is connected to the terminal 410 which is adapted to be connected to the terminal 409 of a cassette with memory to detect the charge on the memory error signal device capacitor in the cassette. The input terminal 410 is connected to the input of an operational amplifier 430 which is connected to act as a voltage follower and impedance buffer, and the output of the operational amplifier 430 is connected to a second operational amplifier 432 acting as an inverter. Thus a voltage received on the input terminal 410 from the capacitor 398 of the memory error signal device, reflecting that the capacitor 398 is charged, is transferred through the amplifier circuits and inverted so that it is applied as a low or binary zero to the set input S of the flip-flop latch 422. This sets the 0 output of the latch 422 to a high or binary one level, which applies a forward bias to the base-emitter junction of a transistor 426 in series with the LED 413 and turns the transistor 426 on to energize the LED 413.

When the cassette is removed from the peripheral device, as previously noted the charge pushbutton 414 is actuated to charge the capacitor 398 of the memory error signal device.

If desired, the monitoring circuit may also be implemented with means to detect the error state of the capacitor 398, and to cause the signal LED 413 to flash or otherwise represent the error state of the cassette memory.

CLAIMS

1. Device for cassettes with memory for storing data relating to the cassette or the tape therein and comprising means for warning the user that the cassette has been introduced and played in a recording and reproducing apparatus which has not been made for a cassette with memory means, characterised in that the cassette is provided with an element which is made and operates so as to comprise a state which is capable of being modified if the cassette has been played without its memory having been activated, and in that the apparatus, which is intended for receiving the said cassette and is equipped with the means necessary for operating the memory comprises means of monitoring the state of the element carried by the cassette.

2. Device according to Claim 1, characterised in that the element carried by the cassette comprises two separate stable states, each of which is representative of a type of apparatus into which the cassette has been introduced.

3. Device according to Claim 2, characterised in that the passing of the element from a first stable state to a second stable state is controlled by an element which is supported by the recorder on which the cassette is positioned.

4. Device according to any one of Claims 1 to 3, characterised in that: once it is moved into its second state, the element which is carried by the cassette cannot return to its first stable state without outside intervention.

5. Device according to any one of Claims 1 to 4, characterised in that the element which is carried by the cassette forms an integral part of a circuit which selects by discrimination the state in which the said element is situated.

6. Device according to Claim 1, characterised in that the element which is carried by the cassette is an electronic component.

7. Device according to Claim 6, characterised in that the electronic component is a capacitance.

8. Device according to either of Claims 6 or 7, characterized in that the differentiation of the state in which are set the electronic means, is ensured by a circuit measuring the charge of said means without modifying said state.

9. Device according to any of Claims 6 to 8, characterized in that the connections inbetween the electronic means and its associated circuit measuring its state are made through the element which ensure the unlocking of the tape reels.

10. Device according to Claim 9, characterized in that the element ensuring the unlocking of the reels also ensure the discharge of said electronic means in case of tape recorders which are not equipped with memory driving means.

11. Cassettes for tape recording and reproducing apparatus provided with a device according to any of Claims 1—10.

12. A tape cassette comprising a memory for storing data relating to the cassette and/or the tape therein, said cassette being provided with an element for co-operation with an apparatus in which the cassette is to be played, said element being operable to indicate a memory error state if the cassette is inserted in an apparatus that does not have means for co-operating with said memory.

13. A tape cassette recording and reproducing apparatus for use with a cassette having a memory for storing data relating to the cassette and/or the tape therein and also a memory error state indicating element, said recording and reproducing apparatus comprising means for co-operation with said memory and an element for co-operation with said memory state element so as to cause said element to move to, or to permit to remain in, a state in which it does not indicate a memory error state.

14. A tape cassette comprising memory error state indicating means constructed and arranged for use and operation substantially as described herein with reference to any of the examples in the accompanying drawings.

15. A tape cassette recording and reproducing apparatus comprising means for co-operation with

a tape cassette having a memory and a memory error state indicating element, and constructed and arranged for use and operation substantially as described herein with reference to any of the examples in the accompanying drawings.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1982. Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.